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The Automobile

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THE AUTOMOBILE LIVERY AS AN ESTABLISHED INDUSTRY.—THE VICTORIA.

The Automobile Livery as an Established Industry.

Quite in contrast to the liveries, to which we have been accustomed, with their foul-smelling stables, which are black spots among our city buildings, are the automobile liveries recently established in nearly all of our large cities. The objections to the former cannot in any way be urged against this more modern institution. It is in every respect modern. The sanitation, convenience, elegance and the fulfillment of its purpose, be it pleasure or business, are in keeping with the opening of the new century so soon to occur.

Although a new institution, comparatively, in its appointments, the variety of service offered and its reliability, it ranks with the best and probably surpasses that which the older methods have furnished. The companies now engaged in this business in nearly all cases furnish cabs of several styles, broughams, runabouts, surreys, victorias or omnibus at a single call or with attendants as private vehicle on monthly rates. While all are handsomely furnished vehicles, and are operated by attendants in uniform, those for private service are considered a little more elegant in interior furnishings.

The victorias illustrated on the front page of this issue is one of many automobiles now furnished to the public by the General Carriage Co., whose general repository is at 66 W. 43d St., New York. This is one of the more recent companies to enter the automobile livery business in New York. The thirty automobiles that form the nucleus of their equipment will be added to as the service is extended. The victoria above mentioned is magnificently finished, and is driven by storage battery and motors neatly concealed in the design of the carriage. It is a product of the Woods Motor Vehicle Co., of Chicago.

Nearly all of the automobile transportation companies maintain a public cab service, and such cabs are to be found at the public stands, and occasionally a night hawk is seen prowling for a fare. This industry is extending not only throughout the large cities of the United States, but to distant Honolulu and the City of Mexico. The fashionable summer resident cities of the New England and eastern Atlantic States have already automobile liveries.

The subsidary companies of the Electric Vehicle Co., of New York, and the Woods Motor Vehicle Co., of Chicago, are most active in the extension of this service. The rates charged will average about as follows: By the month, from $150 for a runabout without driver, to $300 for a victoria with driver and footman; from $1.50 an hour for hansom seating two, to $3.00 for opera 'bus seating six, and from one to three dollars for each additional hour, and for short trips, such as from station to residence, within certain limits, fifty cents for each passenger, hand baggage being also carried.

The Thousand Mile Tour of Great Britain.

The great event among English builders and owners of automobiles, the thousand-mile tour of Great Britain, took place in accordance with the pre-arranged schedule. The main purpose of this tour was to bring the automobile prominently before the people of Great Britain, to show that it is not a toy, but a practical and serviceable reality; to demonstrate the pleasure of automobiling, and to bring out, if there be any, the weak points in the construction of the present types of automobiles.

Sixty-five automobiles started from London, April 23, for this trip. Conspicuous among the number were two of American design, the locomobile and the Brown-Whitney. These vehicles carried nearly two hundred persons. The undertaking, as can be seen, was not of small proportions. The number of persons to be cared for during the ten days, and necessary supplies, etc., for the vehicles, expense in connection with the exhibitions held at the various cities, makes a considerable sum expended.

Of the number that started, forty-eight completed the trip, the others having dropped out at different points. Records were kept of the action of each automobile on the trip, and these records are among its valuable results. Of one we read no repairs required, but delayed on account of bad petrol; of another, broken axle, although running gear was new, and of others, tires punctured, cross-heads broken, belts repaired, etc. When these reports have been carefully classified, it will give builders good information, and owners a chance to compare the different styles, as they all performed practically the same service.

The reports of this tour indicate that it met the success its organizers anticipated, the impressions made being generally good. There were no accidents to speak of, although sections were traversed where automobiles are rarely seen. The delays through mishaps or break-downs were not numerous, and the schedule arranged was closely adhered to.

The hill-climbing trials did little more than demonstrate that the automobile is able to mount any grades encountered on public roads.

Automobile Annex.

Just across the street from the large New York store of John Wanamaker is the automobile annex, where are to be seen sample vehicles of both electric and gasoline type. A new charging plant has just been completed, consisting of an Otto gas engine, belted to a small dynamo. The plant occupies but a small space at one side of the store, and is started quickly when it is desired to charge the battery of one of the vehicles. Mr. S. D. Atkinson is in charge of this department.

What Automobilists Are Striving For.

Better roads everywhere.

Rights in the parks at Baltimore.

A reasonable speed limit at Columbus.

The completion of the National Highway to San Francisco.

Better understanding of their rights on the public highways.

A further concession from the park board at Philadelphia.

The success of the automobile show at the Madison Sq. Garden, New York, this fall.

By the Way.

What is the use of flying in the air when we can fly on terra firma?

We are for the automobile, for the automobilist and for automobilism.

The best lubricant made is none too good for the automobile. It should be clean and of high wearing quality.

The automobile hearse has the advantage of the horse-propelled vehicle in that the speed can be better controlled and the danger of runaways is entirely avoided.

Automobile racing is just as exhilarating and exciting as horse racing. But neither should be indulged in except on race tracks especially provided for the purpose.

The Brooklyn Rapid Transit Co. has been testing an automobile repair wagon, and will probably place them in use to the exclusion of the present horse-drawn affairs.

The Boston Woods Motor Vehicle Company has been organized to establish an automobile livery service in Boston, using the vehicles built by the Woods Company of Chicago.

Money enough has been spent on our highways since the time of our forefathers to make good roads everywhere. Scientific road building wins public approval because it is the greatest economy.

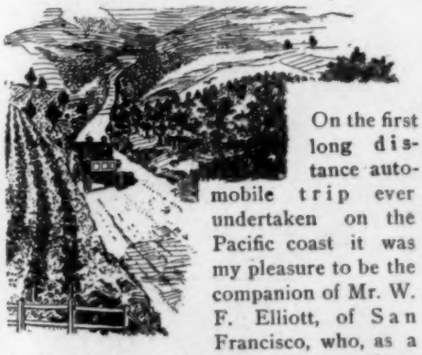
Messrs. Geo. L. Weiss and J. W. Packard made a run from Cleveland to Buffalo on one of the new Packard automobiles, Saturday, May 26, in thirteen and a half hours. They believe this is a record run between these two cities.

A Comparison.

It does not tire.
It does not shy.
It is always ready.
It never goes lame.
It needs no groom.
It never casts a shoe.
It does not pull at the bit.
It needs no whip nor spur.
It stands without hitching.
The automobile never balks.
It is a 20th Century necessity.
It is oblivious to cold and heat.
It is in its prime for years after the horse is worn out with age.
It does not inspire our pity after a long journey on a hot day.

Through the San Joaquin Valley on an Automobile, from Bakersfield to Stockton, 300 Miles.

By B. F. McLeod.



On the first long distance automobile trip ever undertaken on the Pacific coast it was my pleasure to be the companion of Mr. W. F. Elliott, of San Francisco, who, as a builder of automobiles, knows them from a to z. Automobiling is a pleasure at any time, but especially so when an expert handles the levers, and the power which lies therein is displayed to its best advantage.

One cannot realize what it is to take a trip on an automobile through the entire length of the beautiful San Joaquin valley until he has actually experienced it. The fertile valley is a sight well worth seeing and long to be remembered. The beautiful orchards and vineyards that extend mile after mile and will soon yield the fruit which finds its way all over the world, make the country a verdant paradise now but a golden one later.

Flying swiftly over the highway we had but a glimpse here and there. The scene was a swiftly moving panorama, of which much might be written did space permit. The first town of importance reached from Bakersfield was Tulare. We were warmly greeted, but passed on to Visallia, eleven miles further, where the country was one immense flower garden, so thickly and luxuriantly grow the roses and other flowers. At Hanford we passed the Lucern, the largest vineyard in the world. Fresno, the "rasin city," we reached in good time and without a mishap.

Merced was interesting as the principal grain center of the valley, and Modesto as one of the prettiest little residence cities in the State. Our stops at these places were pleasant parts of our trip, and we are indebted to many friends of the automobile for kind entertainment and good wishes. The automobile has evidently a great future before it in California, and the automobile omnibus promises soon to be in evidence between many of these towns. Visallia and Hanford have already made arrangements for such a service. Bakersfield has ordered from Mr. Elliott some six passenger 'buses, which will run to Kern City, about a mile and a half out.

The last part of the three hundred miles was equally as enjoyable as the first, and, as we ran into Stockton, it was hard to realize that the trip was over. In addition to considering this tour as a pleasure trip, it has demonstrated most conclusively the practical side of the automobile. For a run of this length could not be made by a poorly built machine.

Automobile Quarters in Private Residences.

The new residence, the plans for which have just been completed, for Mr. Oliver Crosby of St. Paul, Minn., is to have an automobile and bicycle room on the basement floor, from which an asphalt drive leads to the street. The residence is to be built of buff St. Paul limestone. The automobile quarters are to be fitted with a small workbench, and the floor, which is to be cement, will have a sink at the center, so that the vehicles can be washed conveniently.

Automobile Mutual Benefit and Protective Association.

An association embracing all the operators of public automobiles in Chicago has been formed under the name of the Automobile Operators' Mutual Benefit and Protective Ass'n. The object of the association is:

First: To aid one another in time of need.

Second: To provide a club room and possibly later a club house where all operators when off duty may assemble and discuss the events and happenings of the day or night, and where the single men, especially, may have the comforts and privileges of a home and spend their time, which would be spent to less advantage elsewhere.

Third: Where one may find all the automobile news, and may learn the location and quickest way of reaching any new streets, houses, places of amusement, etc., that may open and be patronized during the season.

Fourth: To promote good fellowship among all concerned, and, in fact, to be of benefit and assistance to one another in every possible way.

The officers are: President, Richard Reynolds; vice-president, G. Willis Templeton; secretary, Stanley E. Stickney, and sergeant-at-arms, George Marshall.

Coming Events.

Elaborate plans are being perfected for the grand L. A. W. festival and good roads congress, which is to be held at Port Huron, Mich., July 2, 3, 4 and 5. An automobile parade and automobile as well as bicycle races are on the program. Good roads promise to be an important feature of the festival.

Bridgeport, Conn., is to have an old-time Fourth of July celebration, with up-to-date features, one of which is to be a parade of gaily decorated automobiles. This number on the program is being undertaken by the Evening Post and Morning Telegram of that city. A handsome trophy is offered to the best decorated motor vehicle.

New Dorp Beach Hotel Bus.

The electric omnibus, shown in Fig. 1, page 93, is one of the novel features of the New Dorp Beach Hotel, Edward Helt, proprietor, at New Dorp, Staten Island. Guests arriving either by steamer or railroad are conveyed to the hotel by this automobile.

The omnibus will seat eight comfortably inside, four on the cross seat on top, and two with the driver. The top seats are the general favorites, especially with the younger members of a party. The roof is strengthened to carry baggage, thus being specially adapted to this service.

It is a recent product of the Riker Motor Vehicle Co. of Elizabethport, N. J., and is operated by storage battery and electric motors. Running at ten miles an hour the battery has a capacity of twenty-five miles.

Automobile Emergency Wagons.

One of the latest uses to which the automobile has been put is in street railway work. The Metropolitan R. R. Co., of Washington, D. C., has just had an emergency or repair wagon built for service on its extension lines. The doing away with horses for traction purposes has made the keeping of two or more horses by street railway companies for special duty both expensive and inconvenient. The automobile is therefore able to meet every requirement, and when not in use the storage space is small and expense of maintenance nothing.

This wagon will carry fifteen or twenty men and their tools. It is provided with an A-ladder, so that repairs to the trolley wire can be made. The complete vehicle weighs about three and a half tons. A towing device for pulling cars onto the track or taking a disabled car to the repair shop is provided. The motive power is an electric storage battery, which is good for twenty-five miles, at fourteen miles per hour. It was built at the Elizabethport factory of the Riker Motor Vehicle Co.

Military Automobiles at Paris.

The military automobiles exhibited by France at the Paris Exposition number twelve and illustrate those designed for the different parts of the service. They are shown equipped as in actual use. The medical wagon contains a complete surgical equipment, supplies, etc. The others are equally complete. They were built by several of the well-known French makers.

A German Show.

During this month there is to be held an automobile exposition at Nurenburg. A very comprehensive exhibit is promised, but chiefly of German makes, as other European countries are too much interested in the Paris Exposition. In connection with the display of the vehicles there are to be contests and trials.

The Marlboro Automobile.

The Marlboro Automobile and Carriage Co. of Marlboro, Mass., is building a line of automobiles of the steam type, of which that shown in Fig. 5 is one of the first turned out. It has a number of novel features about it. The running gear is tubular construction, following in this respect the practice of several well-known builders. The location of the differential gear and application of the brake is also similar, but the usual positions of the boiler and engine have been reversed. This is probably responsible for the fact that all of the extremely long body is taken up with the motive power appliances. The automobile, as illustrated, has but one seat, but another can be mounted back of this one and the vehicle made to seat four.

The wheels are thirty-inch, with ball-bearings, and 2½-inch pneumatic tires. The weight of the single-seated carriage is six hundred pounds. In the finishing as well as the mechanical construction, pains have been taken. The running gear is finished in carmine, and the body in black, with plain panel at the side. The lamps and steering gear are nickel-plated. The upholstering is in russet grain leather, and makes a very neat appearance.

The Autocar Runabout.

The automobile shown in Fig. 3 on the opposite page is one of the new styles built by The Autocar Company, of Ardmore, Pa. The running gear is constructed of steel tubing, the front and rear axles revolving on ball bearings. A band brake, which is operated by the foot, is applied to the rear axle. One controlling lever is all that is necessary to give the variations of speed and reverse. The vehicle's speed ranges from two miles up to 18 or 20 miles per hour, the slow speed being for the hill climbing.

The gasoline is carried in a nickeled cylindrical can at the rear of the seat. The motor is of the four-cycle type, having two cylinders, and the crank set at 180 degrees, and develops 4½-horse-power. In this way all vibration, so common in gasoline vehicles, is obviated. The little button which is shown on the lap of the seat is connected to the gasoline vaporizer, which is entirely automatic at any speed.

In the front of the vehicle, and under the foot board, is located a large radiating can for the circulating water. Water from the water-jacket is forced through this radiating can by a small centrifugal pump, and by using forced circulation through the large radiating surface a small quantity of water will suffice for a long run.

The transmission of power from the motor to the rear axle is by means of chain and sprocket, and the variable speed mechanism of this vehicle is said to be new. The muffler, which will be noticed right under the body below the seat, is sufficiently large. Wire wheels with 2½-inch pneumatic tires are used. All parts of the gear are handsomely painted and nickeled, and altogether the vehicle is very neat and reliable.

The oiling of the motor and various parts is entirely automatic, a small pump supplying the oil from a reservoir to the different bearings and the cylinders in proportion to the speed at which the engine is running. The engine varies its speed from 300 revolutions to 1,000, as well as having a variable speed mechanism in the counter shaft. Everything is enclosed as much as possible to exclude dust and dirt. Another feature of the vehicle is, that the under frame, which is supported by the springs, carries all the machinery and mechanism, so that the bodies of the vehicles can be changed, thereby giving the purchaser an opportunity of having two or more styles of body. By removing four or five nuts and disconnecting a lever, the body can be removed in about five minutes from the frame, leaving all machinery and parts exposed for inspection or for changing the body. A small dynamo is used for electric ignition.

The vehicles are made either with a spindle seat of the runabout type or with hood and storm apron. This vehicle is particularly adapted for physician's use, as it is reliable, easy to start, and requires very little attention.

The company guarantees every part of the vehicle. The factory is fitted up with modern machinery for interchangeable parts, and the purchaser can, at any time, secure a duplicate piece, which is guaranteed to be within 3-1,000 of an inch of the proper size. The company hope to be able to put this vehicle on the market this season at $750.

New Automobile Delivery.

The vehicle illustrated in Fig. 6 is an electric automobile recently completed by Fredk. R. Wood & Son, of New York, for B. Altman & Co. The design is quite original and there are a number of novel features. It is one of the finest vehicles that have so far been produced both in its construction and manner in which it is finished.

The Wood pedestal gear is used, making it possible to set the vehicle low, a point essential to all automobiles, thereby taking away that "where is the horse" appearance. All the fore and aft bending strain on the springs is relieved by the pedestals sliding vertically up and down in the pedestal boxes. There are no reaches used to connect the front and rear axles. A band brake is provided on each rear wheel and is operated by a foot lever on the toe board, and an equalizing lever makes it possible to check the vehicle within its own length without undue effort. The controller which is installed under the seat entirely concealed from view, allows two speeds to the rear and four speeds ahead. The distance capacity of the vehicle is 25 miles on one charge of the batteries at the rate of about ten mile per hour.

The inside and outside lamps are of 10 candle power each. The body within is all upholstered with the finest of morocco leather, and all the mountings are of brass. Entrance is had on either side of the wagon by doors which are large enough to allow a man 6 feet high to stand erect within the vehicle. Having the doors on the side makes it much more convenient for delivering packages. The doors can be opened only from within by a button on either side of the driver. A dummy handle of brass is, however, installed in each door on the outside.

The Winton Surrey.

The automobile shown in Fig. 4 is the Winton surrey, built after the general style of the one-seated carriage. It is roomy and comfortable, and makes a good touring automobile for a party of four, as well as for every-day family use. It is but little heavier than the one-seated automobile, and costs three hundred dollars more. The wheel rims are each four-inch and have a diameter of 36 and 32 inches. The top is very substantial, and when side curtains and apron are on it is well enclosed for bad weather. When top is removed it does not leave an unfinished appearance, as often happens. The motive power is a gasolene engine, and supplies are carried for a hundred miles. Owen & Chamberlin, 120 Broadway, New York, are the eastern agents of the Winton Company.

An Improved Locomobile.

After a year's experience in the use of the locomobile a number of improvements have naturally been suggested to the builders. The model No. 2 as now built, although sold at the former price, is a greatly improved machine. The tanks for water and gasolene have been increased in size and strength. The engine has been improved, and new design of bearings placed on crank shaft. The feed water pump is larger, and an auxiliary hand pump added.

Another important change is the method of conveying the steam exhausted from the safety valves into the water tank, so that the objections to the old method are overcome. An auxiliary throttle valve has been added, which also acts as a locking device when the carriage is left without attention. A water column has been added with gauge cocks, so that the breaking of the water glass does not inconvenience the operator to any extent. A self-feeding oil cup is an improvement that will be appreciated, since it will run the carriage seventy-five miles.

The body and running gear have been enlarged, the latter being longer, with a tread of 4 ft. 6 ins. The seat is roomier and more comfortable. A side draught has been arranged, which prevents fire being affected by wind or speed of carriage.

FIG. 1.—NEW DORP HOTEL ELECTRIC 'BUS.

FIG. 2.—EMERGENCY WAGON M. R. R. CO.

FIG. 3.—NEW AUTOCAR RUNABOUT.

FIG. 4.—WINTON GASOLENE SURREY.

FIG. 5.—THE MARLBORO AUTOMOBILE.

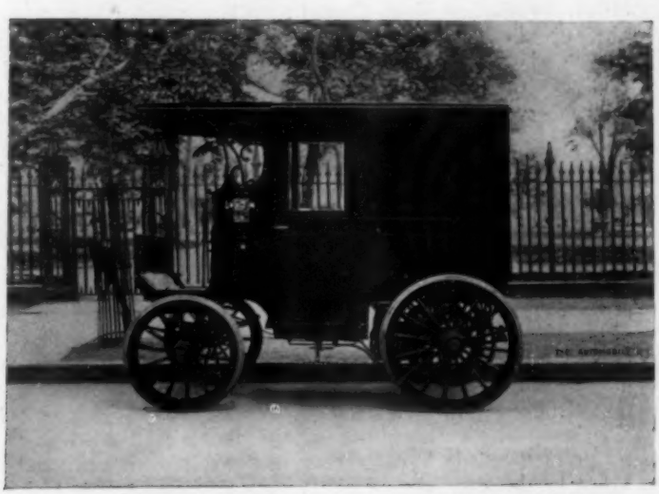


FIG. 6.—NEW ELECTRIC DELIVERY, B. ALTMAN & CO.

SOME NEW TYPES AUTOMOBILES.— (See opposite page.)

Club News and Views.

Club Directory.

Automobile Club of America, Homer W. Hedge, Secy., 120 Broadway, New York; representative to Paris Congress, A. C. Bostwick; representative on International Racing Board, Clarence Grey Dinsmore; substitute, John H. Flagler.

Automobile Club of Baltimore, W. W. Donaldson, Secy., 872 Park Ave., Baltimore.

Automobile Club of Chicago, Andrew R. Sheriff, Secy., Calumet Club, Michigan Ave., Chicago.

Automobile Club of Columbus, Columbus, O.

Automobile Club of Rochester, Fredk. Sager, Secy., 66 East Ave., Rochester, N. Y.

Cleveland Automobile Club, L. H. Rogers, Secy., Cleveland, O.

North Jersey Automobile Club, E. T. Bell, Jr., Secy., Paterson, N. J.

Philadelphia Automobile Club, Frank C. Lewin, Secy., Hotel Flanders, Phila., Pa.

San Francisco Automobile Club, B. L. Ryder, Secy., San Francisco, Cal.

Rochester Club.

The Automobile Club of Rochester has secured quarters at the Hotel Livingston, in the city, and at the Hotel Ontario, at Ontario Beach. The club starts out very auspiciously, and will undoubtedly have a large out-of-town membership as well as resident.

The races held by the club on Decoration Day passed off very satisfactorily. The one-mile race for locomobiles was won by machine owned by Joseph McDuffee and Wm. Murphy. Time, 2 minutes 17 seconds. The five-mile race, open to all kinds, was won by J. J. Mandery in 14 minutes, 42 seconds, with a Regas quadricycle second; F. H. Bettys, third; Remi Miller, fourth, and C. J. Connolly, fifth. The one-mile handicap was won by McDuffee, who started at scratch. Time, 2 minutes, 17 seconds. J. Foster Warner came in second.

The North Jersey Club.

The officers of the North Jersey Automobile Club are: President, Charles D. Cooke; vice-president, Vernon Royle; secretary and treasurer, E. T. Bell, Jr., and captain, Wm. H. Fletcher. The club proposes to take into its ranks all owners of self-propelled carriages. The club will have four classes of membership—active, honorary, life and associate. The club has elected President McKinley, Governor Voorhees, Mayor Hinchliffe and the director of the United States road inquiry board to the honorary class. It is proposed to have club runs every two weeks, and arrangements will also be made with persons in different parts to have a supply of gasoline for the automobile tanks. Plans will be made to secure a place for storing the carriages in the business part of the city for the accommodation of members during the day while attending to business.

The membership of the club is growing rapidly, and the number of persons eligible to membership have also increased since the weather more favorable to automobiling has come.

Philadelphia Club.

The organization of the Automobile Club of Philadelphia has been perfected, with officers as follows: President, Henry G. Morris; vice-presidents, Herbert Lloyd, P. G. Salom; secretary-treasurer, Frank C. Lewin. The membership has already reached nearly fifty. Quarters, centrally located, are to be secured and for that purpose a special committee has been appointed.

The club plans to entertain the Automobile Club of America on their first run to Philadelphia, June 2d. This club promises to be one of the strongest in the country, and will ultimately have a large membership.

Winton in Paris.

The competing representative of the Automobile Club of America, Mr. Alexander Winton of Cleveland, O., arrived in Paris May 18th. Everything about the American racer has been zealously guarded since its arrival. Mr. Winton will become acquainted with the course of the race and in other ways prepare for the contest.

Club Run to Philadelphia.

The run of the Automobile Club of America from New York to Philadelphia, June 2d, promises to be the most successful so far undertaken. It is expected that a large number of automobiles will participate, and there will be included in this number several electric as well as gasoline and steam. There will be three Riker electrics, notwithstanding the distance, which is unusual for an electric.

The route laid out for this trip is from the club to South Ferry, to Staten Island, over the Amboy road to Tottenville, thence by ferry to Perth Amboy, thence to Metuchen, to New Brunswick, Franklin Park, Kingston and Princeton, where luncheon will be served at the Princeton Inn. From Princeton the route lies by way of Trenton, Whitehorse, Bordentown, Mt. Holly, west to Camden, through Moorestown and Merchantville, and by ferry to Philadelphia.

The start will be made promptly at 7:30 a. m., rain or shine, leave Princeton at 2 p. m., and arrive at Philadelphia in time for dinner. The return will be made on the following day. Maps showing the route will be furnished members at the start. Accommodations have been secured at the Hotel Bellevue for members during the stay in Philadelphia

Badge of the A. C. of A.

A club badge has been designed and will soon be executed for the members of the Automobile Club of America. A wheel entwined with a ribbon bearing the name of the club is the design adopted.

Club News.

Mr. D. Wolfe Bishop is temporary chairman of the Committee on Tours and Runs of the Automobile Club of America during Mr. Bostwick's absence in Europe.

The automobile seems popular at the eastern colleges. Columbia has a club, Harvard has a club stable and Yale has a number of automobilists among her undergraduates.

The National Highways Commission has been increased by the consent of Col. A. A. Pope, Col. John Jacob Astor and Gen. Roy Stone to act with the members previously selected. These gentlemen are undoubtedly each well known to our readers, by reputation at least.

An automobile tour in France has been proposed by M. G. de Lefrete, which is similar to the thousand mile tour in Great Britain. The route suggested is from Paris to Lyon, Marseilles, Toulouse, Bordeaux, Tours and on to Paris. It is to be a pleasure trip, and will afford the automobilists to visit together the important places in France. Probably with due respect to the recent crusade against high speeds, twelve kilometres an hour in cities and thirty outside is given as the rate of travel.

A Pleasure Road Through New England Scenery.

A highway that will connect the large eastern cities with the most famous parts of New England scenery is being discussed. As there are several influential persons back of it, there are prospects of its being undertaken. The preliminary plans propose a road starting from Boston and by way of Lexington and Concord to Dublin, N. H., thence through Keene, Lake Sunapee, Springfield to Hanover. From this point a branch through the Berkshires would connect with the road along the Hudson to New York and Philadelphia. The other branch would go from Hanover up through the Connecticut Valley and over to the White Mts. to Plymouth, N. H., and down to the Maine coast and along to Boston. This circuit will be about 500 miles in length and would cost about $3,000,000. A portion of the route, however, lies over good roads at the present time, so that the cost would be cut in half, probably.

Good Roads.

Brooklyn Meeting.

Gen. Roy Stone, E. H. Harrison and others well known to the cause of good roads will be present at the Brooklyn highway meeting June 4th. An interesting program has been prepared. A lecture, illustrated by maps and views, will be given by H. B. Fullerton.

Literature on Good Roads.

The government bulletin, issued by the department of agriculture, entitled Good Roads for Farmers, by Maurie O. Eldridge, will be found very interesting and instructive by all to whom the subject of good roads appeals. It can be obtained free of charge by addressing the above department.

Automobiles have conducted themselves with much more dignity at Buffalo funerals than the horse-drawn vehicles which have been on a strike recently. The public has been well pleased with the service.

Road Capacity.

European farmers haul at one load from two to three tons of produce over their roads, while American often find it difficult to get a ton at two loads to market. Information from twelve hundred counties, obtained by the U. S. Department of Agriculture, gives 25 cents per ton mile as the average cost of hauling a ton mile to the farmers of these counties. Reports from six European countries gives the cost per ton mile at one-third this amount.

Drainage Necessary.

Dirty water and watery dirt, says Mr. Isaac B. Potter, make bad going, and mud is the greatest obstacle to the travel and traffic of the farmer. Mud is a mixture of dirt and water. The dirt is always to be found in the roadway, and the water, which comes in rain, snow and frost, softens it; horses and wagons and narrow-wheel tires knead it and mix it, and it soon gets into so bad a condition that a fairly loaded wagon cannot be hauled through it.

We cannot prevent the coming of this water, and it only remains for us to get rid of it, which can speedily be done if we go about it in the right way. Very few people know how much water falls upon a country road, and it may surprise some of us to be told that on each mile of an ordinary country highway three rods wide within the United States there falls each year an average of 27,000 tons of water. In the ordinary country dirt road the water seems to stick and stay as if there was no other place for it, and this is because we have never given it a fair opportunity to run out of the dirt and find its level in other places. We cannot make a hard road out of soft mud, and no amount of labor and machinery will make a good dirt road that will stay good unless some plan is adopted to get rid of the surplus water.

Brick Roads.

In the prairie states suitable rock for road building is not always available, so that substitute will ultimately be used in place of the macadam road for these parts of our country. Rock, such as certain kinds of shale, is utilized in making brick that are hard and durable for roads. In the more thickly settled sections and village streets, wide roadways are constructed, but this is both expensive and unnecessary for country roads. In Illinois, Indiana and other states single roadways have been constructed of brick at an expense of about a shilling a square foot. A seven-foot roadway of brick, with two feet of crushed stone at each side, makes an eleven-foot road which is found sufficient for most country roads where the heavy teaming is usually in the direction of the market.

Maryland's Roads.

The report of the geological survey of the highways of the State of Maryland for the year 1899 estimates the expenditure on the roads of the state during the past ten years at $6,000,000. One-half of this amount it considers wasted. Many of the roads have no natural drainage, and a large amount of money is spent in repairing poor roads.

Effect of Inclination.

From tests made by the Government Office of Road Inquiry the following table has been compiled which shows the tractive force necessary to haul a load of one ton on roads of the best macadam on the grades given. The table also gives the equivalent length of each mile of grade in miles of level road:

Rate of inclination.	Angle with the level.	Tractive force. Pounds	Equivalent length of level road in miles.
....	0 1 11	...	...
Level	0 00 00	38	1.00
1 in 500.....	0 6 53	42	1.10
1 in 100.....	0 34 23	58	1.52
1 in 80.....	0 42 58	63	1.66
1 in 60.....	0 57 18	71	1.87
1 in 50.....	1 08 16	78	2.05
1 in 40.....	1 25 37	88	2.30
1 in 30.....	1 54 37	104	2.73
1 in 25.....	2 17 26	118	3.10
1 in 20.....	2 51 21	138	3.63
1 in 15.....	3 48 51	171	4.50
1 in 10.....	5 42 58	238	6.26

A. G. Spalding, director of athletics to the American commission, has returned from Paris. Through his influence a change has been made in the dates of many of the contests. Some of the most important events were scheduled for Sundays, but will now take place on the Saturday preceding.

Prices of Automobiles.

It seems that automobiles can make their prices as well as horses by their speed. When a machine has made a remarkable record its value immediately jumps to a correspondingly high figure. The automobiles of Jenatzy and other well-known automobilists have brought astonishing prices. It has recently been reported that Mr. Albert C. Bostwick, of the Automobile Club of America, has just paid something like $12,000 for the racing automobile of Rene de Knyff. If such is the case, that this automobile is coming to America, the chip that has rested so securely on one pair of shoulders is liable to come off.

Tests by Experts.

Plans are being formulated by a committee of the Automobile Club of America for a system of tests which will show the true power and efficiency, the mechanical excellence in general and of various details of automobiles in use. This is being done much after the manner that has been followed by the French Club. At the present time the interest seems centered on the Paris events, but the matter is to be taken up in earnest this summer.

Builders and users will be asked to submit their automobiles for such trials as may be planned. The results, if the tests are accurately and scientifically made, will be useful and interesting. If made along the lines followed in other countries will afford an opportunity to compare automobiles of American and foreign design.

Storage of Petroleum Spirit.

There went into effect on May 15 last in Great Britain new regulations respecting the keeping of petroleum spirit which have been framed with special reference to its use by automobilists. They require that metal vessels only shall be used for holding petroleum spirit, and shall be conveyed in such vessels only, the same being closed so as to prevent the leakage of either fluid or vapor. Such vessels not to exceed two gallons in capacity, and always properly labeled. Building where it is kept, if partitions are of an inflammable character, is not to be used as a dwelling or place where persons assemble. Quantity kept in any storehouse is not to exceed sixty gallons. If there is another building within twenty feet of the storehouse, the owner is to notify the authorities of the fact that he is storing petroleum spirit. No artificial light shall be brought within dangerous proximity to the petroleum spirit. Automobilists using such spirit shall take precautions for the prevention of accident by fire, and shall prevent any person committing an act which would tend to cause fire or explosion.

Improved Coupler.

The inventions of Col. Renard of the French army have greatly increased the efficiency of the automobile tractor and train. It is said that thirty wagons can be hauled in one train by using his couplings, which are stiff spirals. The government has assisted in his experiments, and will give the inventions a trial in the coming army maneuvers.

The Automobile

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The Fast Chauffeurs.

The Parisian police have been making records for themselves against the fast driving automobilists of the city. They have been scoring up the number of arrests for the day as the marker puts down the runs of the leading base ball teams. The police of Greater New York have been doing well against the bicycle scorchers, but ninety-eight in a day is not so large in proportion as the Parisian records showed for many days last month. The magistrates also seemed to be on their good behavior and assessed the maximum fines in nearly all cases. Public sentiment in that country, noted for the number of automobiles in use, seems directed not against the guilty racers, as would be the case in drivers of horse drawn vehicles, but against chauffeurs, as a class.

The International Race

As the time approaches for the great event of the year among racing automobilists interest in the event increases. The competitors for the cup are nearly all on the ground and has each prepared himself for every possible incident of the race. It is a race between giants of skill and intelligence. The courage of a gladiator is necessary in the high speeds attained in races of this class. A steady nerve, quick eye and thorough training are as essential as in any athletic contest. It may be that a reckless daring will win the race, but such methods more often bring defeat, and in this case would jeopardize the life of the driver. Recent events in France should tend to discourage recklessness in contests.

Automobiles as Instruments of War.

Army officials of the European nations have taken a great deal of interest in the application of the automobile to war uses, and appropriations have been made by their respective governments for purposes of investigation. The war in South Africa has proved most conclusively that they will form a necessary part of the equipment of future armies. The automobile tractors with their trains of freight wagons have shown that they are able to make better time and are more reliable than ox or mule outfits; also their ability to move over rough and hilly ground as easily as the former. Grades up to one in twelve can be surmounted, and where steeper places are encountered the power applied to a cable fastened to tree or anchored will draw them up and their wagons. The war has also shown the uselessness of the armored train, since in being confined to a specified route, a gun planted with range accurately obtained is easily able to disable it, as has been done during this war. An armored automobile is, on the contrary, able to move about, and cannot be stalked so easily. The tractors are easily protected by armor against small arms, which is all that has been attempted in the case of the locomotive and cars. Such an automobile carrying field guns and ammunition would be able to plant a battery with little difficulty, and for scout duty or other service which would bring them under rifle fire would be of great value. The chief objection made against the automobile tractor and train is that if the automobile is injured the wagons are helpless. This is also true of the locomotive. Automobiles can be constructed after the style of the steam truck, which would carry a load and be complete in themselves. This form would not be the most economical for the transportation of goods. It would be difficult to build one automobile that would meet every service in an army, and each department will ultimately have its specially designed vehicle.

A Question of Responsibility.

While the laws of the Medes and Persians have stood through centuries as an example of unchangeableness, in this progressive age we find that our customs and laws do change. In some states a few years ago the owner of a field of corn must provide suitable means to keep his neighbors' cows from devouring it; but more recently the responsibility for the actions of the cow has been placed on its owner. But a few years ago the ox alone disputed the supremacy of the horse on the highway; then the bicycle and electric car gradually established their rights, and more recently the automobile has established an equal claim to the public roads. The shifting of the responsibility from the owner of the corn to the owner of the cow has been repeated in questions respecting our highways. The owner of a horse should assume the responsibility for the actions of the horse from the moment it comes into his possession. If the animal is vicious and a runaway, it should either be prohibited the public highway or the owner required to give suitable bonds as a surety for indemnity in case damage to persons or property resulted. As the country becomes more thickly populated greater intelligence is demanded of both the driver and the driven. Education is as essential to one as to the other. When the question of responsibility has been more clearly established in the minds of all users of public roads, there will be a less number of runaways, fewer suits for damages and less ill-feeling between users of the different forms of locomotion, to say nothing of the trouble which the guardians of the public parks have experienced during the past twelve months.

Power on G ades.

To drive an automobile weighing five hundred pounds at a rate of ten miles over smooth roads requires about two horsepower. If the road is on a grade of one per cent., nearly fifty per cent. more tractive force is required, according to McNeill's table. As the grade increases, the force necessary to drive the vehicle must increase in a greater ratio. When the grade

reaches an inclination of one in ten the tractive force required is six times that on the level and the force needed to drive the carriage one mile on such a grade would drive it six miles on a level road. The extra force necessary to start a carriage on a grade does not increase in the same proportion, but relative to the running force decreases as the grade increases.

Respecting Speed on Highway.

The question has arisen as to whether the laws and ordinances which relate to the speed of bicycles on public streets apply to the automobile. Judge Sutherland, in a recent decision, said that the statute against the use of any steam vehicle in public streets unless a person is sent at least an eighth of a mile in advance to warn travelers of its approach, does not apply to the steam automobile, although broad enough to cover it. The laws and ordinances respecting bicycles do not specify automobiles, but are possibly broad enough to cover them. Magistrate Mead, in a court in New York, recently decided that automobiles came under these laws, and imposed fines accordingly. If this ruling is to stand, automobiles will be limited to the same speed as bicycles, and the penalty for exceeding the limit will be three dollars or more. Few persons will object to this ruling, and it would be better were the question decided at an early date. To arouse in this country such a sentiment as has been raised in France would be a detriment to the industry.

Cost of Good Roads.

The cost of good roads in the different states varies greatly, as would be expected from the wide difference in their typography. The three hundred miles Massachusetts has built cost $3,000,000, or an average of $10,000 per mile. New Jersey has built four hundred and forty miles of road, much of it gravel and some but ten feet wide. This improvement has cost $2,000,000, or an average of about $4,545 per mile. The New York State engineer estimates the cost of a macadam road, sixteen feet wide, in that state, at $8,000 per mile. Much depends on the character of the ground on which the road is built and on the distance the materials have to be carried. At Montclair, N. J., a macadam road, sixteen feet wide, eight inches thick, was built at a cost of $6,940 a mile. In Middlesex county, N. J., the Cranberry road was built at a cost of only $3,841 per mile. It is built of trap rock macadam, twelve feet wide and eight inches thick. In another part of the same county the cost of a similar road was in excess of $5,000 per mile. Prices for macadam, independent of the preparation of the road to receive the macadam, in that state, vary from forty to eighty cents per square yard for roads eight inches thick. In the preparation of the road bed there is as wide a difference as in the road itself. This is one of the important parts in the construction of a road. If the foundation is not good the surface soon becomes broken. This fact, together with proper drainage, will often form a considerable part of the expense of construction. Reducing grades, securing additional right of way and bridges are special expenses incurred in connection with the construction of good roads.

The Gasoline Automobile.

It matters not the form, or use to which a motor is put; if it possesses economy it will quickly secure a place for itself. This fact has drawn around the gasoline motor numerous experimentors who have produced great improvements in its design during the past few years. As a stationary motor its field has spread until it commences to supplant in certain lines motors which a few years ago were enthusiastically considered ideal. This has been done purely on a basis of economy. Its economy is especially marked in the small engine. While the fuel saving between gas and coal amounts to nearly forty per cent., in the small steam engine there is a still greater advantage in favor of the gas engine. It is only a few years since a hundred horse-power gas engine was a curiosity, but at the present time they are built of several times that size. French builders have secured a world-wide reputation for their motor vehicles propelled by gasoline motors. They have proved reliable and economical. America is making her reputation and a greater variety in sizes and styles are promised shortly. The construction and operation of the gasoline motor will become better understood by the general public as builders take more pains in their catalogues and literature to explain the details of their vehicles.

Electric Motors.

The engineer who designs the equipment of an automobile finds that he has one element to consider which has not been so important a factor in other lines. This is that element of lightness which is of still greater importance in the flying machine. The electric motor in the hands of the engineer who is seeking to save a pound here and a half pound there is capable of quite a transformation. In this, however, there is danger of reducing the efficiency, in which case in his efforts to save weight he has simply transferred it from the motor to the storage battery. On account of the varying conditions under which the automobile is operated that degree of lightness is not attained which would still give a good efficiency under normal conditions for the reason that the motor with a relatively greater proportion of iron responds more quickly to an overload. In order, therefore, to secure reliability under all conditions of use, the motor is not built after the lightest design. Then the motor is but a part which must be considered with the methods of transmitting the power to the driving wheels and the means for giving an independent motion to each of two wheels. While it is possible to reduce the weight of this part of an electric automobile, it is not prudent to do so. One of the important things to be considered in the design of any system is reliability, and this should not be sacrificed to lightness.

The Motor Bicycle.

The motor bicycles of foreign design have many of them a common fault which riders report as serious. One class, especially those that mount the motor over the forward wheel, are spoken of as being most faulty in design. The motor, whether weighing twenty-two or more pounds, when placed above the wheel, is sufficiently heavy to make steering difficult and the sliding of this wheel when turning any but the longest turns and at even moderate speed, has proved very objectionable to riders. Those accustomed to the ordinary bicycle know how easy it is for the forward wheel to slip on a wet place when making a turn or dodging a hole, and will appreciate the disadvantage of having the weight of the motor placed high on the wheel and especially over the forward wheel. This feature of a motor cycle is probably one of the most important.

The Omnibus.

There seems to be a general demand for an automobile propelled by gasoline or steam to carry from six to ten or more persons. Quite a number of electric automobiles carrying this number are in use, but summer resorts and places at a distance from charging stations demand the former. Builders have been so busy in meeting the call for runabouts that little attention has been given other styles of automobiles. This is a field in which the automobile seems well adapted. Automobile 'bus lines will probably be seen as the forerunners of electric railway lines, gradually developing a system of transportation. One strong point in its favor is the fact that such a line can be operated as business demands. There is no power house force to maintain whether travel is light or heavy, and no interest charges on a large investment.

Road Along Drainage Canal.

Cook county, Illinois, Republicans have expressed themselves in favor of a boulevard along the Chicago drainage canal and of good roads in general in the following resolution: "We believe in a system of good highways for any community or state, and inasmuch as the taxpayers of this district have expended $34,000,000 for a drainage canal, a roadway along said canal would be of great benefit to the community, a nucleus for a good roads system in the state, pleasure driveway for carriages, a course of automobiles and a path for cycles, and we hereby indorse the movement to procure said roadway."

Correspondence.

Space will be given on this page to letters concerning the Automobile, its operation or construction, to accounts of tours or runs, routes of travel, good roads, etc. Discussion of subjects concerning the Automobile is solicited. When requested by correspondents their names will not be published, but must always be given in the communication to the Editor.

Houston, Texas, May 26th, 1900.
THE AUTOMOBILE.

Dear Sir: It is surprising that there are no horseless carriages in Houston or Galveston of modern design, the only one I know of being in Galveston and very unattractive. When you take into consideration that Houston possesses more finely paved streets than any city in the state and is continually extending the very best of pavements in every direction, and when it is known that Harris County is practically free from debt and has many macadamized roads extending out in the farming and garden districts, and that this county will have a $600,000 bond issue in August to perfect our good roads in five different directions from the City of Houston to the county line, it is surprising that the manufacturers of automobiles have not established a first-class agency at Houston.

Think of the thirty-five miles of magnificent, hard, shell beach and the shell roads at Galveston. The beach is said to be the most beautiful known to civilization. The country between these two cities, which are fifty miles apart, is settled with numerous villages, and the good roads system is being so thoroughly developed that within the next few years this particular coast country of Texas will rival the suburbs of your best eastern cities.

We have organized a strong committee in the interest of pushing the development of our good roads and drainage and we note with pleasure the numerous articles in your publication on the subject, which we have used to the very best advantage and frequently find arguments therein that assist us in our work.

I hope to be able quite soon to organize an automobile club here, and believe if we do so and a live, progressive agency is established in this city that we can soon induce at least a fair number of our well-to-do citizens to invest in the best vehicles that are on the market, for there is no country that offers more delightful days and evenings during the year for out-door pleasure than we have, and if the use of the mobile is once started, we have the right to expect that it will not only furnish much pleasure, but come into business use rapidly.

Harvey T. D. Wilson.

Clyde, N. Y., May 20th, 1900.
Editor THE AUTOMOBILE.

Dear Sir: Can I replace my horse by an automobile that will not cost more at the end of the year and will perform the same service? Which is the best to buy? Please give me the addresses of those you recommend. Yours,

Idenis L.

A.—You should be able to replace your horse by an automobile if you have the money to buy one or credit to the necessary amount. Whether it will cost more at the end of the year depends much on the amount of use and the care taken of it. It would be very difficult to give general figures, and it would be more difficult to say whether it would perform the same service. If your horse has plowed the garden, carried you to market, helped to work the road tax and operated the treadmill cutter that worked up his feed, I know of no automobile that will replace him. If, however, you want an automobile for the road, good for one or fifteen or more miles an hour, the advertising pages of this number will give you the addresses of several builders.

Chester, Pa., May 4th, 1900.
Editor THE AUTOMOBILE.

Dear Sir: (1) What are the heaviest grades that the different styles of automobiles can climb? (2) What is the greatest speed attained? and (3) by what make?

I receive your paper regularly and find it very interesting.

Yours very truly,

Joseph Ewing.

A.—(1) See THE AUTOMOBILE for March, 1900, page 44. (2) See THE AUTOMOBILE for October, 1899, page 18. Jenetzy made one kitometre (.62 × mile) in 47¾ seconds at Park d'Achere, Paris, April 29th, 1899. (3) A specially constructed gasoline automobile. At the recent meet of French chauffeurs at Nice, Thevy drove a Decauville automobile carrying two persons 100 kilometres (62 + miles) in one house 47 m. 47 s.

---

20 Broad St., New York, May 12th, 1900.
THE AUTOMOBILE,
No. 150 Nassau St., New York.

Gentlemen: Enclosed is a challenge to the automobile world for a contest with the Pennington War Machine. We should be pleased to have same given space in your columns, as it is of undoubted interest.

Next week an exhibition will be given to the Press of the speed and road qualities of one of these machines, and your representatives in this city will be duly invited to attend. Kindly oblige us with their names and addresses.

Very truly yours,
Anglo-American Rapid Vehicle Company.

New York, May 12th, 1900.
THE AUTOMOBILE,
No. 150 Nassau St., New York.

Gentlemen: The present War Machines built by the Anglo-American Rapid Vehicle Company, under Mr. E. J. Pennington's patents, and known as the Pennington War Torpedo, which patents have been taken out in every country in the world where patents can be obtained, are without a doubt the fastest, lightest and strongest machines ever constructed, and to prove this statement I wish to make the following proposition to any and all comers who may wish to enter into competition against Mr. Pennington's machines either in America, England, France, Germany, or any other country. Such test to take place in either one of the first fourmentioned countries.

For oil driven or gasoline automobiles I will at distance from 100 to 1,000 give all such automobiles an allowance of 15 miles in every 100. In other words, while they do 85 miles our machines must do 100. For vehicles driven by steam, electricity, compressed air or any other power, we will give an allowance of 30 miles in every 100. If the roads are extra heavy with sand or mud, and have extra hilly and rough surfaces, we will give an additional al owance of 5 to 10 miles in every 100, according to the condition of the roads.

This offer will hold good for acceptance for 60 days from this date. While these machines have not been built for racing purposes, but for war purposes, this matter of speed will show the ability of our vehicles for running over rough ground. I have myself ridden over ploughed fields at 30 miles an hour, and have been a passenger of one among six of these machines when 64 miles an hour was easily obtained on a slight up grade.

All correspondence to be addressed to me, at No. 20 Broad St., New York.

Very truly yours,
H. B. Twyford,
Manager War Machine Department.

Here and There.

Montclair wants automobiles instead of street cars on her streets.

An automobile omnibus of the electric pattern is reported to be in operation in St. Louis.

Elizabeth, N. J., proposes a line of automobile coaches, which may possibly be run out as far as Morristown, 18 miles distant.

Stage lines, Lyons to Sodus Point, N. Y., on Staten Island, N. Y., Long Island resorts, and several other places, are being talked of.

Members attending the Electric Light Convention at Chicago last month took an automobile outing, lunching at the Washington Park Club.

The Philadelphia park commissioners have extended the park roads on which automobiles are permitted. They seem to be getting more light.

Russia contemplates purchasing automobile freighters for the use of her army, and has asked builders to send sample wagons for tests that will be made by army engineers.

Automobile Gas Engine Ignition.

The jump spark method has been brought into favor since the advent of the automobile. It is the most effective method of igniting gas engines running at high speeds. It is considered by many to be the most up-to-date method of igniting, and it will probably find favor with builders of the slower speed engines as soon as

FIG. 1—AUTOMOBILES IN THE SOUDAN.

they find out how to master the difficulties that accompany its use. One piece of pertinent advice we would offer the experimenter with the jump-spark, is not to attempt to build your own coil, but buy it of a maker who has the necessary experience and skill at his command. Insulate both electrodes and make the surface of insulating material (that it is necessary for the carbon to bridge across before making a short circuit) as large as the space will permit. Use about a half-inch-spark coil and place the terminals so that the air-gap betwen them is not over ⅛-inch. This will make the spark a hot one and strong enough to prevent bridging between the terminals. It should be remembered that it is more difficult to insulate for the high voltage necessary with this spark and that the best materials and the best of care in their manipulation should be used when insulating the ignition plug. Mica and porcelain are good insulators, while asbestos is practically useless. The porcelain should be glazed. If it is intended to dispense with the vibrator and to use the induction of a single make and break in the primary for the spark, it should be remembered that the spark produced when the primary circuit is broken is much stronger than that when it is closed, and only this spark should be depended upon for ignition. If the engine is to run at high speed, so design the switch that it will keep the circuit closed long enough to establish the necessary amount of magnetism in the core of the coil. If the spark proves to be a weak one, and other conditions are right, look to the switch for your trouble. When purchasing a coil, buy one that has been designed for the purpose and not one of the variety sold at toy stores. There are several on the market built expressly for gas engine ignition.—E. W. Roberts, in Machinery.

Automobiles in the French Soudan.

One of the most interesting applications of the automobile has been made the past season in the French Soudan. Up to the present time transportation in that region has been confined to the navigation of the Senegal and Niger rivers, their tributaries and two or three short lines of railroad. Recognizing the wonderful advantage gained by a connection between the upper parts of these rivers various plans were considered by French engineers. The great cost of a railroad over the rough country prohibited the construction of such a system. Various trials had shown the automobile to be serviceable and the plan of establishing a line of automobile freight wagons and omnibuses was undertaken last fall.

Some fifty automobiles were ordered from MM. de Dietrich, fitted with nine horse-power Bollee motors. These have now been in service some three or four months, and so successful are they considered that similar lines are contemplated for Madagascar, Tunis and other places. Gasoline motors are the motive power and Chinese are employed for operating them. The operators are said to learn their duties very rapidly and are considered very reliable.

Repair shops have been established at Badombe and store houses for gasoline at different points along the route from Toukoto to Bamakou. The company operating this line is the Societe des Transports Automobiles du Soudan Francais. The distance between the above-mentioned towns is about one hundred and sixty-five miles.

On the opening of this line in January last a party, including the governor of the

FIG. 2—AUTOMOBILES IN THE SOUDAN.

territory, traveled over the route, riding six hours a day, and completed it in six days, where formerly it required fifteen. The illustration, Fig. 1, shows this party on the trip. The automobile heavy trucks are shown in Fig. 2. These illustrations are taken from le France Automobile.

New York State is said to have 123,000 miles of public roads. Massachusetts has 20,500 miles of important public roads.

The Construction of Steam Wagons for Heavy Duty.

By Arthur Herschmann.

As regards the construction of steam-propelled wagons, we find that in spite of the fact that steam equipment has been known for many generations—the wagon building has been going on for thousands of years—comparative success has only been obtained within the last few years. Messrs. Scotte and Serpollet, De Dion in France, were the first to revive the movement, but in the last few years more progress was made in England, in which country the best steam wagons, so far, have been produced. Easy riding wagons have been constructed for many years, and boilers, steam connections and engines do not give much trouble on rock bottom foundations, but when we attempt to locate engine and boiler on a wagon, which latter they have to drive without suffering from the shock of the locomotion on rough roads, new complications arise which are infinitely more important and troublesome than most people believe who have devoted themselves to the study of this subject. We find early attempts to effect this compromise in a steam vehicle built by the Ericssons in England in 1830, who placed a vertical engine on the rear of their vehicle and coupled it up with a long, springy connecting rod to the front wheels, which acted as drivers, thereby preventing successive shock being transmitted from the wheels to the engine.

IRON TIRES.

Wheels in themselves are far more important problems than is generally believed. My opinion is that at the present day no form of rubber tire will give satisfaction on a commercial wagon intended to carry a net load of, say, one ton or more. The rubber tire is not only expensive, but gives poor satisfaction under the combined action of great weight and speed. Attempts have been made to retain the desirable features of a rubber tire, protecting the latter with a tire shield of steel, dating back as far as the early 70s, but it would seem that such combination is just as troublesome to maintain. Steel tires, if properly applied to stiff wooden wheels, have been proven to stand most severe work, and they afford the advantage of strengthening the wheels very considerably. It is my opinion that well constructed springs of ample proportions are alone the means to lessen the shock to which a wagon wheel is subjected. In the case of dished or cored wheels, which I consider to be best adapted for heavy work, a steel tire is indispensable, since it binds the wheel together and prevents the spokes from being torn out when striking an outer obstruction. There is considerable divergence of opinion as to whether a comparatively narrow tire or a wide tire should be used, whether the wheels should be small or large, and whether the front or

hind wheels should be driven or steered. While it is a fact, even in the case of motor-propelled vehicles, that the width of the tires should be smaller on hard roads and greater on soft roads (but not on sandy roads or in snow), I think that in the case of steam wagons the total width of the tires in inches should be at least twice the number of gross tons carried when small wagons are concerned, say, of a capacity of two tons of net load; this coefficient of two, to decrease in the case of very heavy wagons to one, and even under.

SMALL WHEELS DESIRABLE.

The reasons why small driving wheels seem to be exclusively used on motor wagons are mostly that it is difficult to design large wheels which will stand such severe strains as motor wagon wheels are subjected to. In this case the spokes of the wheels not only support the load, as in a horse-drawn vehicle, but they are more or less affected by the action of the driving power, and, moreover, there is a tendency to twist them. With the ideal wagon wheel the power should be applied directly where the wheel touches the ground. In reality we drive onto a spur wheel, or chain wheel, concentric with the wheel, but, of course, on a smaller diameter, and such an arrangement makes it desirable that the wheel should also be small. Another reason making small wheels desirable lies in the requirements of the wagon and the working of a high-speed motor. In other respects it seems to me that a large driving wheel, say, 4-ft. diameter, will answer much better than a 3-ft. wheel, such as has been almost exclusively applied to steam wagons. I consider that not only will a 4-ft. wheel allow of a more powerful starting torque, but it will also save the driving gear, seeing that it does not sink in as deep as a small wheel when it passes over a depression in the road.

DRIVING AND STEERING WHEELS.

The argument presented by advocates of the "front driving" system is that the wagon will steer a straighter course when the wheel strikes an obstruction, for the reason that the front wheels in striking tend to run over the obstruction, instead of being forced aside. I have seen such wagons steered behind and in front, and my opinion is that any advantage of front driving is more than outbalanced by the disadvantages introduced in connection with awkward location of the machinery. One of the early steam wagons was driven by all four wheels, and if such driving could be practically effected I think it would prove an excellent feature of a wagon. There are, roughly speaking, two steering systems used—steering with a fifth wheel, and secondly, steering with pivoted axle ends. It would seem that the fifth wheel arrangement is more adapted for heavy work, leaving the wagon axle unbroken. In reality this system cannot be as satisfactorily applied as steering with pivoted axle ends. To effect the steering of heavy wagons spur gearing of suitable purchase has to be used, or a worm and worm wheel device. The latter seems to answer in one of the best designed wagons, but I do not consider it as desirable as steering by means of spur gearing, since it locks the gear, and besides causes a severer strain on the wagon in case the front wheels strike an obstruction. In rounding a curve the inner wheels necessarily describe a smaller circle than the outer wheels. To make this practicable the steering device has to be correctly designed, and the two driving wheels have either to be driven by independent motors or have to be linked together by means of a compensating gear, or, as it is often called, "Jack-in-the-box." It will be found that in a heavy wagon, particularly one using dished wheels, this driving and the arrangement of the compensating gear are rather troublesome, and that there is still great scope for improvement in this connection.—Abstract from paper read before the Am. Soc. of Mech. Engrs.

Some Novel Motors.

By Ampere Field.

The difficulties that are met with in the application of electric power to the wheels of the automobile have been overcome by inventors in many novel ways. It is noticeable, however, that as one studies the designs of inventors, in overcoming one difficulty one or more advantages of previous methods are often lost. In one case it may be simply neatness and lightness of appearance, and in another the efficiency of the motor. Two novelties in this line which possess interesting features have been introduced in the automobile industry.

In one, which is the invention of a Mr. Egger, of Vienna, Austria, all gears and pinions have been discarded. The general design is shown in Fig. 1. The motor is of the multipolar slow speed type. The armature is mounted on the extended portion of the hub of the wheel and revolves with it. The commutator has been very ingeniously placed within the circle of the

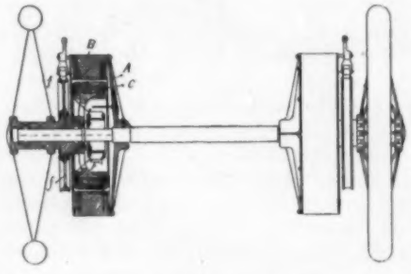

FIG. 1—SOME NOVEL MOTORS.

armature, so that the width of the motor is only that of the armature windings. The axle is stationary and the frame supporting the fields is fastened to it and the frame of the running gear. A brake can be applied to a friction pulley located between the wheel and motor, indicated by ff. B is the field, C the armature and F the commutator. Two motors are used, one applied to each wheel on the rear axle. It will be noted that a different gear is not required, neither pinions nor single gears. The motors are entirely enclosed.

A second type of motor is being built by the Hub Motor Co. of Chicago. The vehicle wheels possess specially con-

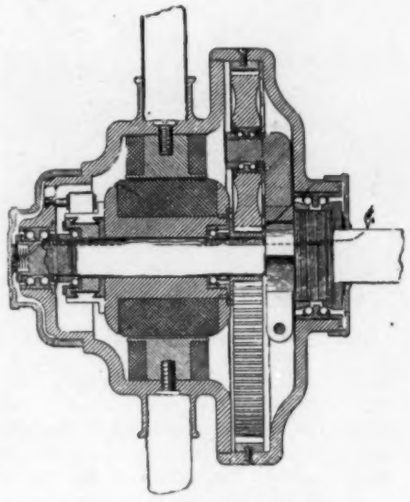

FIG. 2—SOME NOVEL MOTORS.

structed hubs, to the inner surface of which the fields of the motor are attached, as illustrated in Fig. 2. The fields, of course, turn with the wheel. The hub casing also bears on its inner surface a gear into which meshes an intermediate gear turning on a stud fixed to the axle, which is stationary. The armature is mounted on a hollow shaft or quill, and drives the hub through the intermediate gear by a pinion on the extremity of its shaft. The armature as well as the field are thus free to turn, and thus the relative speed between them may be high, which is conducive to the efficient operation of the motor.

The current must necessarily be conveyed by means of sliding contacts and the wires are carried to them through grooves in the stationary axle. The motor is fitted with ball-bearing throughout. It is entirely enclosed in a dust-proof case. Two motor wheels are used on each automobile, and on the larger, heavier vehicles four can be used.

The Canda "Auto-Quadricycle."

In THE AUTOMOBILE for January last appeared an illustration of the "auto-quadricycle," made by the Canda Mfg. Co., of Carteret, N. J. In the two cuts shown herewith the construction of the different parts are shown. Fig. 1 shows the position and method of attaching, while Fig. 2 shows the parts in section. The motor is a single cylinder, four-cycle, gasoline type.

The cylinder (6) is placed above and behind the rear axle (136, 137), to which it is geared. It has deep ribs cast upon it to secure the greatest radiating surface. The piston (11) and the piston rod (30) are similar to those of single-acting steam engines. There are, however, two flywheels (4 and 5) placed close to each other within the crank case.

The feed, or inlet, and exhaust valves (48 and 44) are placed on the side of the combustion chamber (7), one over the other—the exhaust valve below and the inlet valve above. Both valves are held upon their seats by spiral springs. All the attention they require is to see that they are kept clean. The exhaust valve (44) is worked by a cam (38) through the valve stem (45). The inlet valve (48) is worked by the incoming gas, as the piston (11) moves downward.

The exhaust cam (38) and gear wheel (37) is upon a short shaft which receives its motion through the gear wheel (36). The gear wheels (36 and 37) have a ratio to each other of 1 to 2, which gives the latter one revolution for two revolutions of the main crank shaft. This reduction of motion is necessary because the exhaust valve is lifted but once in two revolutions. If these parts are removed for any purpose, the greatest care must be taken to replace them in exactly the relative positions they are intended to occupy. For this purpose they are carefully marked. This is necessary in order to time the working parts correctly.

The gasoline tank (A) has a capacity for something over three quarts. In it the gasoline is evaporated and the vapor mingled with air to form an explosive mixture. The tank is filled through the tube o, which is closed by a cork. Above this is the air inlet tube a. The rod b projecting from this is the stem of a float b1 which indicates the level of the gasoline. The air enters

FIG. 1—THE CANDA "AUTO-QUADRICYCLE."

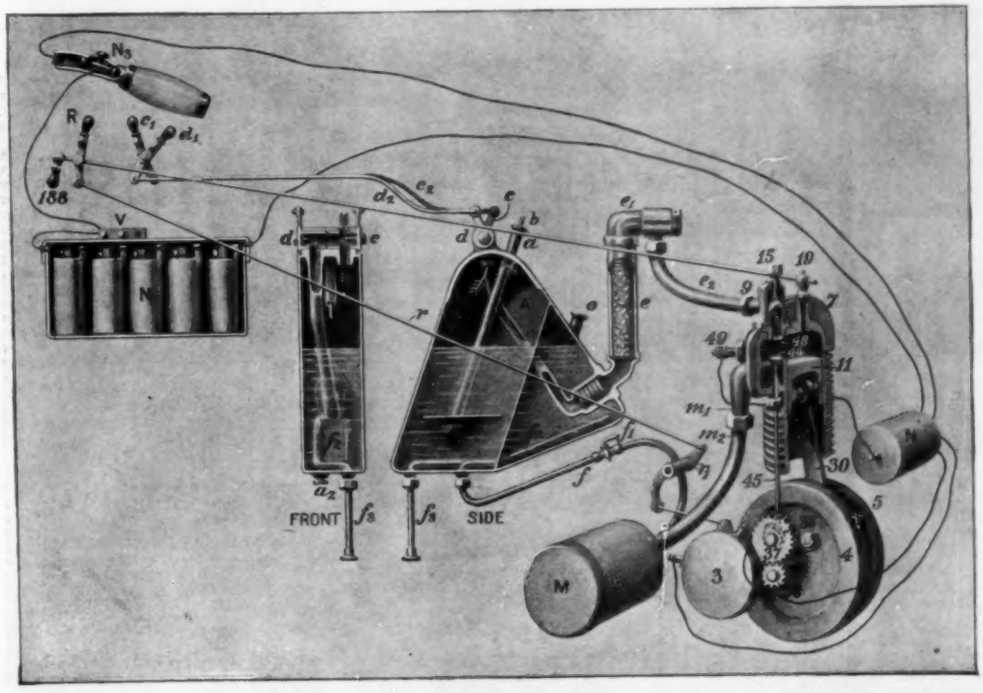

FIG. 2.—THE CANDA "AUTO-QUADRICYCLE."

through the tube a, passing up through the fluid during the intake stroke, and becomes saturated with the gasoline. This vapor goes to the engine through the mixture valve c. The course is indicated by the arrows. From this valve it goes to the throttle valve d, which is in the same casing. The two are sometimes spoken of as a double valve. The gas valve c regulates the mixture, while the air valve d controls the quantity which reaches the cylinder. Each one can be operated independently through the rods and handles marked c1 and c2, controlling the air, and d1 and d2, regulating the quantity.

War Automobiles in South Africa.

Unprotected traction engines were used for transport purposes in 1870, the Germans moving their siege guns around Metz by their aid. In the war in South Africa they have had more extended application, but when unprotected by armor they are so easily subject to capture, even by the enemy's raiding parties, that they require a convoy of troops to protect them. If, however, they were armored, the gun detachments of the guns transported, or in case other material is transported, of guns specially mounted, could protect themselves, and artillery would be required for their capture.

For these reasons England had six such traction trains constructed, each consisting of one armored engine and four bullet-proof cars, two of which were recently completed and tested. In the test the cars were loaded with pig-iron to represent the load to be carried on service, and two 6-inch howitzers were hooked on at the end of the train, making the load behind the engine thirty-three tons. With this load the engine found no difficulty in ascending a hill as steep as 1 in 13. The engineer has only two narrow slits on each side of the fire-box as peep-holes for observation in steering, nevertheless, he took part of the train (one car and a howitzer dragging behind it) over a newly-ploughed field and through a gate only ten inches wider than the engine.

The wheels, for ordinary roads, have riveted to them strips of tees, about 5 inches across and 2 inches high, forming regular teeth, giving an excellent bite on the ground; for very soft ground special spuds are provided, which are sections of T-iron, about 5 inches deep, flanged to hook over the edge of the wheel rim, and so arranged as to be put on or taken off quickly and readily. For still softer ground, a rope is provided, by means of which, when fastened to any fixed subject ahead, the engine can pull itself along.

The boiler, engine and gears are inclosed in one-quarter-inch nickel steel plates, capable of resisting the small-arm bullet at 20 feet, stopping shrapnel or shell fragments.

The cars are designed to take a 6-inch breech-loading howitzer and its limber inside, or a 4.7-inch gun. If the guns are dragged along behind, the cars are used to carry ammunition (100 rounds for howitzer or 125 for 4.7-in. gun each). The cars are protected by ¼-inch vertical armor, and 3-16-inch side armor, inclined at 30 degrees. For loading and unloading each car is provided with two inclined ramps of heavy steel. The rear of each car can be opened, and by means of the traction rope the engine can haul up the load.—The Sun, New York.

The Oxford Steam Carriage.

A steam carriage of the stanhope pattern, as illustrated in the accompanying cut, is being built by the Oxford Automobile Co., of 53 State St., Boston, Mass. The company also builds runabouts, and two-seated family carriages, ranging in price from $850 to $1,200. One of the special claims made for this style of automobile is that the steam is so condensed within the vehicle that none is visible without. The method of starting, or firing-up, is very simple. A little gasolene is allowed to escape, so as to fill a projection below the admission valve; the pilot light is lighted; the burner soon begins to act, and steam rapidly rises. The time required is four or five minutes from the first touch until you are on the road.

The boiler is of the usual tubular form, and is fitted with a regulating device for controlling the supply of gasolene. In addition to the water gauge, there are three gauge cocks so placed as to indicate the amount of water in the boiler. The engine has cranks and rods covered. The storage tanks hold twenty-four gallons of water and five gallons of gasolene. This automobile, when ready for the road, weighs about 950 pounds. It is said to be a thoroughly serviceable automobile, and it gives in comfort and speed all that is ordinarily required.

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The Hill, Whitney & Wood Co., Waltham, Mass.

UPTON TRANSMISSION GEAR.

A transmission gear especially designed to meet the requirements in either a steam or gasoline automobile for connecting the engine to the rear axle is being made by the Upton Machine Co., of New York. The general form of this mechanism is shown in the cut herewith.

The shaft extends through the centre of the gearing, and is made of one piece only. At either end it may be connected by half coupling directly to the motor shaft, or as an intermediate, by means of chains or spur gearing. Upon the transmission shaft, and an integral part of it, are the two pinion gears which are the direct drivers. The disk farthest to the left rotates loosely upon the shaft, and by means of three studs placed equidistant from the hub, is the support of three small spur gears. These gears are in mesh with one of the pinion gears and an internal gear. By compressing the brake, the disk is rigidly held and the movement of the pinion gear being imparted to and continued by the three spur gears, causes a reverse movement of the annular rack surrounding them. The rack is firmly fastened to a metal ring, a section of which would show a Z-shaped formation top and bottom; and the internal gear, being fastened to and enclosed by one side of the ring, the other side is used as a support for the casting holding

the second annular rack, which is also flanged for a brake band, the casting revolving loosely on its support. Compression of the brake in this case holds the rack, and as the support of the rack also carries three spur gears in mesh, both with the rack and the other central pinion, it will be seen that the rack, being held, the rotation of the pinion driver must be continued by the three spur gears, and the supporting studs around which the gears revolve, being not only attached to the Z or cone shaped structure, but also to the flange which carries the chain sprocket, it will be seen that the movement of the three spur gears is coincident with the movement of the sprocket, and the slow speed ahead is produced. The purpose of the sprocket or spur gear, should one be substituted, is to effect the connection with the rear axle. Next to the sprocket is a simple and efficient friction clutch. By this clutch the mechanism, in its entirety, is locked to the shaft and the fast speed is obtained.

MAJOR CEMENT.

A necessary article in the tool bag of the automobilist as well as cyclist is a supply of cement, one of the best known of which is Major's. Major's rubber cement is as good for a pair of rubber boots as an automobile tire—if it's rubber, it will mend it. Major's leather cement is the proper thing for leather. A hundred and one different articles are quickly made whole by the use of these cements, and a supply should be kept on hand for the emergency which comes unexpectedly. All dealers and druggists keep it and should your dealer be out send your order to the makers direct. Major Cement Co., New York.

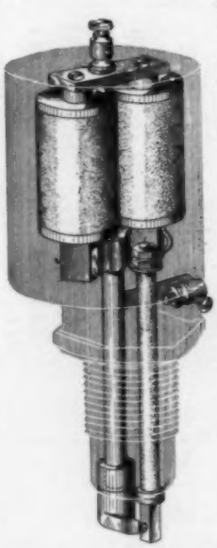
LINING FOR STORAGE BATTERY BOXES.

In the operation of the storage battery the heat and gases arising, and the occasional spilling of the electrolyte, plays havoc with the boxes holding the batteries. The practice of street railways using storage batteries, of which there are a number in Germany, is applicable to the automobile. It has there been found that the paints and compounds of the Standard Paint Co., of which P. & B. is the general name applied to the paint, ruberine, ruberoid and junction box compound, is a safe lining to use.

IGNITER FOR GAS ENGINES.

A device that has been favorably commented on for the ignition of the gases in a gas engine is illustrated herewith.

The apparatus consists of a plug of sufficient length to screw into the cylinder or firing chamber. On top of this plug is mounted an electro-magnet, connected with an insulated post carrying a fixed electrode projecting beyond the bottom of the plug and tipped with platinum. The magnet core ends outside the plug and is used to attract an armature on the end of a rocker arm, which also extends through the cylinder and carries the other platinum contact point. When the magnet is energized, the armature will be attached and the contact points separated, thus making a spark direct from the current. An instant later the induced spark from the electro-magnets follows. When the current is broken the armature is retracted by a spring and the contact points close. The rocker arm is packed with powdered graphite, making a joint that is self-lubricating and gas-tight. The usual methods of wiring are not followed, as less battery may be used, the current returning through the engine as a ground. A cam on the engine makes and breaks contact to operate the magnets and the inventors prefer the use of a magneto on the engine and driven by it, as it is cheaper, more positive than battery and more easily kept in order, while the independence of ratio between spark and current allows the use of weak currents for heavy sparks. A shunt and push button allows the use of the igniter by hand when starting large engines. The igniter may be attached to any engine. It is made by Cotton & Kunze, Chicago.



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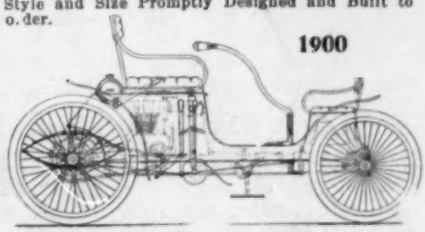

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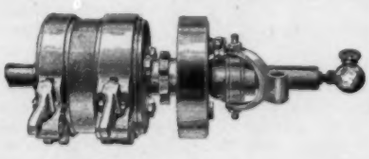
The Upton Gear



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Patents.

List of Automobile patents granted during month of May.

647,426—Battery Plate and Method of Manufacturing Same. Issued to P. G. Salom.
647,377—Antifriction Bearing. Issued to H. P. Colby.
647,113—Antifriction Bearing for Vehicle Axles. Issued to E. Phipps.
644,368—Axle Bearing. Issued to A. D. Bloch.
646,997—Roller Bearing. Issued to E. Jones.
647,019—Supply Valve for Hydrocarbon Burners. Issued to A. H. Moses.
647,442—Storage Battery. Issued to C. J. Coleman.
647,085—Storage Battery. Issued to H. S. Gladstone.
647,098—Cellular Elastic Tire. Issued to A. Kitson.
647,170—Tire Fastener for Vehicle Wheels. Issued to C. Waechter.
647,190—Pneumatic Tire. Issued to Lins & Gunther.
647,118—Compounding Fillings for Rubber Tires. Issued to T. Seehausen.
647,118—Vehicle Tire. Issued to H. Schnepp.
646,982—Automobile. Issued to R. Hazen.
647,261—Frame for Automobile. Issued to W. Hay.
646,993—Automobile. Issued to F. K. Irving.
647,262—Operating Mechanism for Automobile. Issued to W. Hay.
647,251—Suspension for Motor Vehicle Storage Battery. Issued to G. H. Condict.
647,077—Rim and Means for Holding Tire Covering. Issued to J. Cottrell.
647,583—Explosive Engines. Issued to C. A. Scott.
647,600—Automobile Running Gear. Issued to L. T. Gibbs.
647,502—Roller Bearing Casing. Issued to C. S. Lockwood.
647,788—Cycle Cab. Issued to J. C. Anderson.
647,789—Multicycle Cab. Issued to J. C. Anderson.
647,785—Multicycle. Issued to J. C. Anderson.
647,650—Vehicle Brake. Issued to C. Daniels.
647,505—Vehicle Frame. Issued to Maxim & Pope.
647,914—Battery Receptacle for Electric Vehicles. Issued to G. H. Condict.
647,668—Collapsible Receptacle for Vehicles. Issued to Williams & Walsh.
648,078—Automobile Steering Device. Issued to J. H. Pope.
648,087—Automobile Carriage Wheel. Issued to C. W. Salisbury.
648,070—Motor Cycle. Issued to J. Greffee.
648,273—Electric Motor Brake. Issued to C. A. Lindstrom.
648,122—Electric Igniter for Explosive Engines. Issued to W. F. Davis.
647,946—Electric Igniter for Gas Engines. Issued to W. H. Cotton.
648,014—Motor Vehicles. Issued to C. E. Woods.
648,286—Motor Vehicles. Issued to Overman & Bullard.
648,059—Motor Vehicle. Issued to E. S. Sutch.
648,210—Road Vehicle. Issued to W. P. Kidder.
647,941—Vehicle Wheel. Issued to J. Burns.
647,978—Vehicle Wheel. Issued to D. L. Mabry.
648,179—Vehicle Wheel. Issued to J. Shellenberger.
34,559—Design for a Self-Propelled Vehicle. Issued to W. S. O'Connor.
648,635—Vehicle Tire. Issued to F. A. Sieberling.

New Books.

The Gas Engine Hand-Book. By E. W. Roberts. The Gas Engine Publishing Co., 1900., Cincinnati, O. 16mo., 220 pages, 39 illustrations. Price, $1.00.

A manual of information for the designer and engineer. The subject is presented in convenient form and in a manner that makes it doubly interesting. The author is a recognized authority on the subject of the gas engine and presents not only the principles on which the engine is designed, but points out the troubles that are liable to occur in their operation and gives instructions for overcoming them. While but a single chapter is given to the automobile gas engine the other portions of the book apply equally to this type.

Horseless Vehicles, Automobiles and Motor Cycles, Operated by Steam, Hydro-Carbon, Electric and Pneumatic Motors. By Gardner D. Hiscox, M. E., New York, 1900. Norman W. Henley & Co. Large octavo. 316 illustrations, 400 pages. Price, postpaid, $3.00.

This is the first comprehensive American book relating to the automobile and is, therefore, welcomed the more heartily. It brings together many types of motor vehicles now on the market, but the difficulties that beset the author in collecting the information on account of the industry being in its formative period and manufacturers, with few exceptions, not having the designs of their vehicles perfected, will account for lack or completeness in many portions of the book. Some of the more prominent vehicles in this line are omitted on this account. The matter in the main is reliable and is presented very clearly. Those portions relating to devices and appliances used in the construction of an automobile are the more interesting and will probably be best appreciated by both builders and users of automobiles.

Trade Notes.

The 1900 catalogue of the Regas Vehicle Co. of Rochester, N. Y., show besides bicycles several lines of automobiles—Woods, Elgin and Orient.

Automobile gears and similar appliances are listed in a pamphlet issued by the Boston Gear Works. It will be found of interest by all builders of self-propelled vehicles.

The main office and works of the Hasbrouck Motor Company are at Piermont, N. Y. The company is now getting out a line of gasoline automobiles and the new factory is said to be very busy.

The Eckhard Motor Co. of Brighton, N. Y., near Rochester, is building motors for automobiles. A recent catalogue shows the Eckhard launch motor which is made in sizes from one to eight horse-power.

The Schaum Automobile & Motor Mfg. Co. of Baltimore, Md., is just finishing up the first lot of automobiles, which will be delivered to customers who have waited for them. These are of the light runabout type.

MARK VII is the character that designates the style of parcel delivery most familiar to the reader. It is illustrated and described in a pamphlet issued by the manufacturers—the Electric Vehicle Co., New York.

A little pamphlet issued by Haynes-Apperson Co. of Kokomo, Ind., is devoted to an explanation of the automobiles built and their care and operation. The large general catalogue presents the different styles of self-propelled vehicles. They are interesting and well worth a perusal.

The first catalogue of the Century Motor Vehicle Co. of Syracuse, N. Y., is out and shows a line of automobiles embracing steam, electric and gasoline. The electric runabout has been illustrated in a previous issue of this paper. The styles include runabouts, deliveries and surreys.

A very neatly gotten up pamphlet of the Washington Electric Vehicle Trans. Co. of Washington, D. C., shows the extensive styles of automobiles kept for public service by this company. The matter and illustrations are nicely executed and is most complete as to the service given by this company.

The Automobile Supply Co. of St. Louis, Mo., has about everything in the automobile line now listed. Motors and all attachments for gasoline vehicles are now furnished by this house. In fact, if one wished to assemble an automobile he could buy here all parts necessary for that purpose.

The Clark Cycle Tire Company of Boston, Mass., are having excellent success with their Clark valveless pneumatic tire. Many of the leading carriage manufacturers throughout the country are very much pleased with it. In the fall the company intends to push their automobile tire.

The American Electric Vehicle Co., New York, reports many inquiries for automobiles of all kinds, and a rush of orders from all over the country. The company now has its factory at Hoboken, N. J., in active operation, and the first lot of vehicles turned out since removing the factory from Chicago will be ready for delivery in the early part of May.

Some very neat advertising novelties are being distributed by G. E. Hall of 211 Center st., New York. "Locobile" is a special lubricant for motor vehicles and the pencils, which are enclosed in a neat box, are reminders of the excellence of this lubricant. The vest pocket note book, bound in black leather and with gold-edged leaves, contains the correct address for obtaining a supply.

The Autocar Company is incorporated under the laws of Pennsylvania for $1,000,000 and the factory, which has just been erected at Ardmore Station, Pa., is now running almost full capacity, the only delay being lack of material. This, however, will be remedied in the near fuutre, and by the middle of June they hope to be able to turn out vehicles at the rate of one a day, and if possible more.

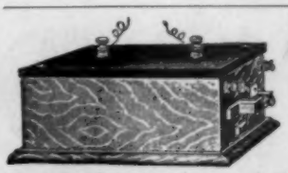
The Crest Mfg. Company, manufacturers of the Crest motors, has just got into its new offices at No. 83 Portland street, Cambridgeport, having given up the offices in Dorchester. The company's office is now next to the works, and as there will always be a carriage at the office with one of the Crest motors on it, it permits customers and friends to see the motors in operation under all conditions of road and grade.

Among new companies incorporated for the building of automobiles are the New Era Automobile Co., Portland, Me., capital $300,000; Motor Cycle Mfg. Co., Portland, Me., $100,000; United Power Vehicle Co., New York, $1,000,000; Boston Gas Motor and Automobile Co., Kittery, Me., $500,000; Co-operative Wheel Co., Toledo, O., $5,000; Balzer Motor Co., New York, $1,000,000, and the Overman Automobile Co., Springfield, Mass., $250,000.

Wagon Bodies Telephone 3109 18th St.

J. P. Sjoberg & Co.
145-147 Eleventh Ave.
New York City

Made to Order for **Automobiles**



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Acknowledged by authorities to be the MOST UP-TO-DATE method of electric ignition. . . .

Manufacturers of Electrical Specialties.

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THE LIFE OF AN AUTOMOBILE.

The easy working of the parts and the comfort of the driver **Largely Depends Upon Perfect Lubrication.**

Dixon's Pure Flake Graphite Is the only lubricant that can withstand the heat in a gas-engine cylinder. Pure flake graphite perfectly lubricates motor cylinders and all working parts. We prepare Special Lubricants for Gears of Electric Motors and Special Lubricants for Chains of Motor Vehicles. *Correspondence solicited.* Samples free to responsible parties.

JOSEPH DIXON CRUCIBLE CO., JERSEY CITY, N. J.

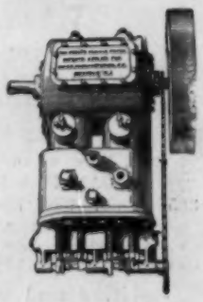
Thoroughly Reliable . . . .

Gasolene Vehicle Motors

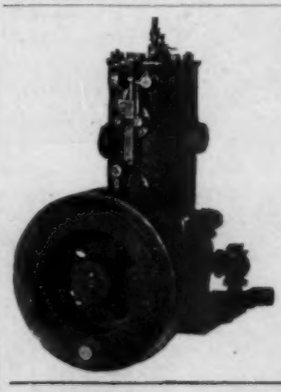
are manufactured at

3, 5 & 7 Oliver Street, Newark, N. J.

By the QUICK MANUFACTURING CO.



We have a Motor Vehicle in daily demonstration and we are pleased at any time to demonstrate the same to prospective buyers, and if they will inform us on what train they will arrive, our Motor Vehicle will meet them at the depot. The Chestnut St. station of the P. R R. is nearest our factory.



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1-2 to 2 Horse Power

With or without Water Jacket for

AUTOMOBILES AND LAUNCHES.

Vertical or Horizontal; Electric Ignition.

☞ Large factory suitable for experimental work. Any style of carriage built to order from owner's drawings. Larger sizes for heavy vehicles in course of construction.

MALTBY AUTOMOBILE CO.

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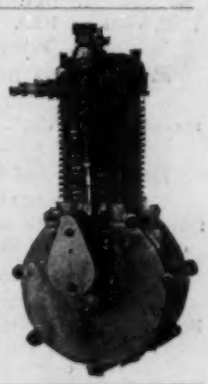

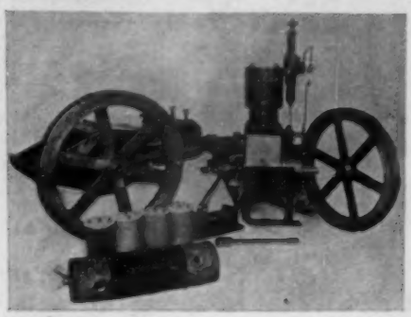

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Several Styles of Running Gears and all kinds of Automobile Supplies

Our engines are built for Automobile work, and we guarantee them to run with less noise, odor and vibration than any other engine made.

Our Mufflers will muffle the noise completely.

Send for Bulletin. State what you want.

Automobile Supply Co.

Office: 3215 Washington Ave., St. Louis, Mo

JUL 28 1900

Trade Notes.—Continued.

The Eastman Automobile Co. of Cleveland has brought out a new design of steam stanhope. The running gear is of bicycle style of construction, with a very comfortable looking body.

The James H. Lancaster Co., New York, is now building a three-seated surrey with a special combined air and water cooling device for use in Porto Rico. The company is also building some new runabouts similar in design to those already constructed, but some two inches higher.

A pamphlet compiled by Fred. D. Stanley of Boston, Mass., treats of the rights of the automobile on the public streets. The matter was originally published in the report of Mr. Whittlesey, having been preeepared at his request, and now appears in the separate form to provide copies for friends who have requested them.

Books for Automobilists

Sent post-paid on receipt of price by
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Gas, Gasoline and Oil Vapor Engines.
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Contains chapters on engines for automobiles, recently revised and up-to-date

Gas and Oil Engines.

By DUGALD CLERK.
Sixth edition. 1896. 558 pages, 8vo., cloth. Price, $4.00.

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By FREDRICK GROVER.
Second edition, cloth. London. 1898. Price, $2.00.

The Theory of the Gas Engine.

By DUGALD CLERK.
Second edition, with additional matter. 12mo., cloth. New York. 1891. Price, 50 cents.

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A manual of concise and specific direction for the construction of small steam engines and boilers from 5 horse-power down to model size.

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Flexible leather; size, 4½ by 6½; 330 pages. London. Price, $1.00.
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We Make, Rent, Recharge and Repair Storage Batteries.

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Pop Safety Valves, Cylinder Relief Valves, Steam Gauges, Automatic Water Gauges and Guage Cocks for

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for testing storage and primary batteries

For Automobiles
An indispensable instrument for testing batteries whether used for ignition or propulsion of the carriage

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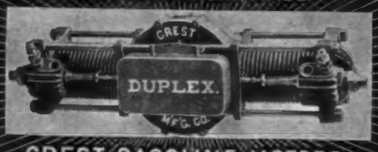
To Repair Broken Articles use

Major's Cement

Remember
MAJOR'S RUBBER CEMENT,
MAJOR'S LEATHER CEMENT.

CREST MANUFACTURING CO.
CAMBRIDGEPORT, MASS.



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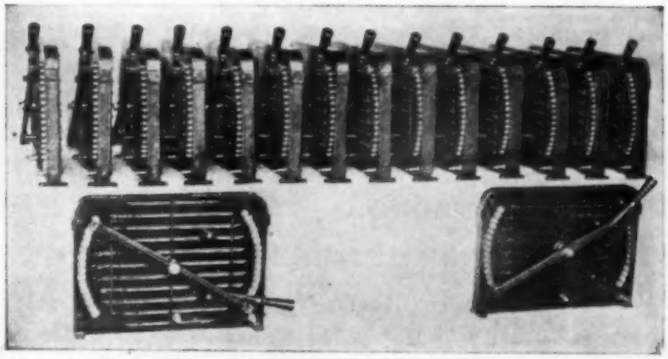

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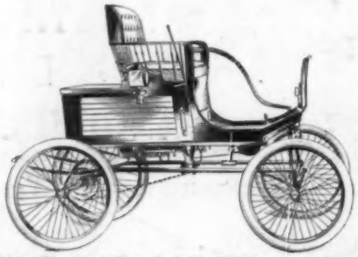

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